

SCIENCE

FRIDAY, AUGUST 19, 1887.

THE MEETING JUST CLOSED in New York, of the American Association, has been generally voted a success. The attendance was not so large as had been hoped, but the character of the papers was satisfactory. Against the ordinarily large attendance at the meetings held in Eastern cities, there were this year registered not many over seven hundred. This may have been due partly to the late announcement of the place of meeting, and to a slight change from the usual date, — two circumstances which may have rendered it impossible for many to change their summer plans so as to allow of a week's visit to New York. The fear of hot weather in New York City has not been fulfilled. The next meeting of the association will be held at Cleveland, O. An invitation from Toronto unfortunately came just too late to allow of its being accepted. A list of the officers for the next meeting will be found in another column. In the general meeting of the association a few important resolutions were passed. The association expressed its opinion that the efficiency of the United States Geodetic Survey would be greatly increased if a superintendent were appointed who was thoroughly trained in the methods of geodesy; and it was resolved to ask the President of the United States to appoint a scientist to this position, instead of the present superintendent, who was only temporarily appointed. The second resolution which was passed by the association refers to the establishment of a bureau of standards, in which standard measures of electricity, heat, weight, length, etc., may be obtained. A motion of Prof. Cleveland Abbe was passed, requesting Congress to have an index of the publications of the Signal Service published. Scientists would be gratified if Congress should make a reduction in the tariff on scientific books and instruments.

THE SUBJECT OF MEDICAL LEGISLATION is attracting the attention of both the medical and legal profession throughout the country; and while it is generally conceded that the laws have in the past, either by reason of innate defects or their non-enforcement, permitted the practice of medicine by quacks and charlatans of the most pronounced type, still there is a sentiment, which is growing, that the State can go too far in its restrictions and exactions. This sentiment forms the basis of an address, entitled 'State Control of Medicine,' which was read before the Monroe County Medical Society by its president, Dr. Louis A. Weigel, the full text of which is published in the July number of the *Medical Press of Western New York*. In his opening remarks, Dr. Weigel says that it is usually considered absolutely necessary that there should be medical legislation to protect the public against quackery and imposture; that the lives of the people are directly endangered by incompetent and ignorant charlatans; and that it is the duty of the State to exercise a paternal control over its subjects, and dictate to them whom they shall employ when sickness invades their homes. He proposes in this address to investigate the practical results obtained by State interference in medical practice, and endeavors to show that no law has yet been passed which has had the slightest effect in suppressing quackery or protecting the community against imposture. The report of Drs. Dunglison and Marcy, a committee of the American Academy of Medicine appointed to ascertain the practical working of laws regulating the practice of medicine in the United States, is referred to at length by Dr. Weigel. The facts presented by this committee were obtained by correspondence with physicians in the various States and Terri-

tories. In New York the law has been inefficacious. From Michigan the answer came that the entire good of the law has been to give lots of quacks a legal standing. In Tennessee any and all may set up for physicians, and starve or make money, as the people decree. After referring to other States, the president says, "If any further proof of the inefficiency of legal enactment to suppress charlatanism is needed, I am at a loss to know what additional evidence I could present that would be more conclusive." He firmly believes, that, if no attempt at medical legislation had ever been made, the profession to-day would be held in higher estimation by the people, and occupy a still loftier position than now obtains. It is somewhat singular that the remedy for all this, in accordance with the view of Dr. Weigel, should be more legislation; and yet that is practically the outcome of what he proposes. He says that every year the multitude of medical colleges throughout the land send forth a large contingent of half-educated stupidity, endowed with the coveted half-yard of parchment, which a confiding public accepts as a guaranty of competency. It certainly has no standard to go by. The remedy for this suggests itself. The teaching and licensing bodies must be separated. The suggestion here made by the doctor is not a new one in this State, and is practically in operation in other States. It is more than probable that the next New York Legislature will be called upon to enact some such law as this. While theoretically it seems to be what is needed, we have never been able to see how it can be practically accomplished in this State without the danger of making it a political measure.

PROCEEDINGS OF THE AMERICAN ASSOCIATION.

Section A.

THE Mathematical Section was without a vice-president through the absence of Professor Ferrel of Washington, who had been elected to that office, but at the opening meeting of the association the vacancy was most satisfactorily filled by the election of Prof. J. R. Eastman of the Naval Observatory. A further consequence of this change of officers was that there was no vice-presidential address in Section A, which therefore held no meeting on Wednesday afternoon. On Thursday morning, however, the section convened with a fair attendance, including at times a number of ladies, who apparently did not find the abstruse subjects discussed at all beyond their comprehension or interest. Several papers were upon what is known as 'personal equation.' One by Professor Eastman called forth remarks by Professors Hough, Harkness, and others, from which it appeared that there is still considerable uncertainty in the matter; it being by no means sure that the results derived from the personal-equation machine are comparable with the personal error of actual observations, nor that the error is the same for light and dark illumination. Professor Eastman concluded that many of the Washington observations on record can only be made valuable after a further discussion of the personal equations involved. Mr. Farquhar criticised Mr. S. C. Chandler's conclusions in regard to the dependence of personal equation upon the stars' velocity. Mr. H. B. Fine gave a general proof that the singular solutions of differential equations of the second order have always a tangency of the second order with the consecutive curves in the system to which they belong.

Professor Harkness's interesting paper on the visibility of objects seen with a telescope was an account of the result of some experiments on the distance at which objects become invisible when viewed through small holes of different sizes. It incidentally brought out the fact, that, when the image of the object fills the pupil of the eye, further magnification is of no value, and led to the

speaker's giving a method by which any one can measure the size of the pupil of his own eye, all the apparatus needed being easily constructed from a half-sheet of writing-paper. Mr. Brashear exhibited a new form of comet-seeker, very conveniently arranged, consisting of a Newtonian reflector of six and one-half inches clear aperture, mounted with an altazimuth motion, the eye-piece being placed in the horizontal axis, so that the observer has no need to change his position while sweeping the sky. He also showed a modification of the Merz-Young polarizing helioscope, less liable to breakage than the old form; and in a third paper he advocated the adoption of standard sizes for screws and draw-tubes for astronomical instruments, so that the parts may be interchangeable, — an improvement whose utility seems self-evident, especially if combined with the adoption of metric units for the standards.

Professor Boss presented a list of over twelve hundred stars with large proper motions, whose data, collected from various sources, will, however, need to be verified before detailed publication.

The last paper of the day had been postponed from the first place on the list, and was by Prof. F. N. Willson. He presented a systematized nomenclature for the roulettes, or trochoidal curves, in which he recognizes the fact that the same curve may be generated in two ways by varying the relative size of the circles and the position of the tracing-point.

On Friday morning only seven papers were assigned to Section A, and two of these failed to appear. Mr. Woodward's paper on a method of computing the secular contraction of the earth, and Professor Stone's on the perturbations of the orbit of Hyperion, were of a technical character, consisting of a discussion of the differential equations involved in the problems. The interest of the morning, however, centred about the papers of Professors Mendenhall and Webb. The former was upon the eccentricities of guessing. The circumstances which gave rise to it were these: a number of persons having recorded their guess of the number of nails contained in a glass carboy, the nails being of various sizes, large and small, these guesses were given over to the professor for discussion. The results were plotted with amount of guess and number of guessers as abscissa and ordinate, and were found to agree pretty well with the probability curve; but the maximum of the curve did not coincide with the actual number of nails, showing that the average guess was considerably below the truth in this case, reasons for which were easily suggested. Mr. Farquhar suggested that the use of the logarithm of the number guessed for abscissa would bring the two curves into closer agreement. The author rather objected to his own title, and thought this was not really a case of guessing (which should be entirely without the bias of any reason), but rather a series of estimates. It is no doubt true, that, while some of the numbers were careful estimates, others were the most random guesses, made without ever seeing the carboy. The guesses numbered over seven thousand, and varied from forty-three to over three million, both extremes being seriously given. The true number was 2,551, as ascertained later by actual count. Professor Webb advocated the introduction of the idea of mass into the definition and formula for the moment of inertia, defining it as the summation of the mass into the square of the distance from the axis, or the mass which at unit's distance will have the same energy at the same speed of rotation. The discussion which followed, participated in by a number of those present, brought to light the fact that a good many persons object to the use of the term 'inertia' at all, some preferring 'moment of mass,' while others were content to retain the term because used in so many valuable memoirs already in print.

There was no session of Section A on Friday afternoon nor on Saturday; and on Monday, no papers being assigned to the section except the two which failed through absence on Friday, and their author still being absent, the section adjourned finally, so far as reading of papers is concerned.

Section B.

THE address of Vice-Pres. W. A. Anthony before the Physical Section, at its opening on Wednesday, was on the importance to the advancement of physical science of the teaching of physics in the public schools. Professor Anthony took the ground, that, since there is a strong re-action by which the applications of science

stimulated the development of the science itself by awaking more general interest and by bringing out phenomena that call for explanation, the cause of pure science will be advanced by giving inventors and all concerned with the application of physics a more thorough training in the principles of that science.

This training must be given by the public schools, and should begin early, and be prolonged over several years of the course, so that such a principle as the conservation of energy shall not be to the student something which he learned in cramming, during one year or a part of a year, a very difficult subject called physics, but it shall be as familiar and well understood a fact as that water will not flow up hill. When this is the case, the labors of inventors may be expected to be more fruitful, because more intelligently directed, and science itself will be advanced.

The most important paper of the session was presented by Professors Michaelson and Morley, and was on a method of making the wave-length of sodium light the actual and practical standard of length. The methods that have heretofore been advanced for this purpose all depend on the use of the diffraction grating, and do not afford a sufficient degree of accuracy in the comparison; for, as was remarked by Professor Rogers, before the wave-length of sodium light can be taken as the standard of length, it must be possible to lay off a distance on a scale which shall represent a given number of wave-lengths, at least as accurately as it is possible to compare two standard scales. Messrs. Michaelson and Morley allow sodium light to fall on a piece of plane parallel glass, where it is divided into two beams at right angles to each other, which are reflected back by two mirrors, and again brought together into one beam, which falls upon the observing telescope. Interference bands are seen, which depend on the difference between the distances which the two beams traverse. One of the two mirrors is provided with a screw motion, by which it can be moved back or forth in the direction of the beam of light which falls upon it. If, now, it is moved, the observer at the telescope, by counting the number of interference bands which cross the field of view, can determine the exact number of wave-lengths of sodium light corresponding to that distance. By this arrangement a distance of one decimetre can be directly determined; and by successively measuring off ten decimetres, and by having the marking diamond rigidly attached to the mirror which is moved, Professors Michaelson and Morley believe that they will be able to lay off a length of one metre, in terms of a given number of wave-lengths of sodium light, with an accuracy of about one part in a million, which is at least twice as accurately as two metres can be compared; but, in finding the number of wave-lengths that correspond to a metre, they will of course be limited by the accuracy with which the microscope can be set on the graduations of the standard.

A second paper of great interest was by these same investigators, and was an account of some experiments by which it was sought to measure the velocity of the luminiferous ether relative to the earth, by the interference between two beams of light, which were reflected back and forth a number of times, one being in the direction in which the ether was supposed to be moving, and the other at right angles to that direction. No effect was found, so that it was concluded that the ether must be very nearly at rest with respect to the earth; but this result leads to serious difficulty in explaining aberration, and should be carefully scrutinized.

Prof. William A. Rogers, to whose enthusiasm and skill in a very arduous field of research American investigators are so greatly indebted, presented a number of papers to the association, in one of which points of great importance in the exact measurement of lengths were brought out; in particular, that, in comparing standard scales, a time when the temperature is slowly changing is the worst possible, and that such comparisons should be made either with constant temperature, or at a certain critical time in the day when the temperature is changing quite rapidly, the time depending on the relative masses of the bars and on other circumstances. In the case cited this critical time was about 6 A.M., and measurements a half-hour before that time showed errors about equal in amount and opposite in direction to those made a half-hour after it.

Prof. W. F. Magie, in a study of capillarity, showed reasons for believing that the contact angle of water and glass is not zero.

It is striking evidence of the great velocity attained in tornadoes that straws and bits of hay are often driven like darts into pine boards, and even into the dense bark of hickory-trees. Professor Mees found, that, to obtain similar results by shooting straws from an air-gun, velocities of from one hundred and fifty to one hundred and seventy-five miles per hour were necessary.

Professor Mendenhall read a paper giving an account of the changes in the electrical condition of the atmosphere that are observed during thunder-storms, and referred to the excellent work done by the New England Meteorological Society in the study of these most interesting phenomena.

Prof. E. S. Nichols gave an account of a battery-cell on which he and Mr. W. S. Franklin had been experimenting, in which both electrodes were iron; but one was in a magnetic field, and the other not. The magnetized electrode was found to be sometimes electro-positive to the other, and sometimes electro-negative, depending on whether its magnetic poles were exposed to the liquid, or whether the neutral part alone was so exposed. A difference was also found between those liquids tending to produce ferric salts and those forming ferrous compounds.

Professor Barker presented two papers on behalf of Mr. Edison, in one of which a magnetic balance similar in principle to Wheatstone's bridge was described, by which the relative magnetic permeabilities of different samples of iron can be rapidly tested. In the other paper, Mr. Edison described an ingenious form of apparatus, which he calls a 'pyro-electric dynamo,' in which an electric current is obtained directly from heat-energy through the induction produced by alternately heating and cooling an iron core placed in a strong magnetic field and surrounded by an insulated coil.

Mr. C. E. Monroe presented to the section the results of some curious experiments in which blocks of gun-cotton, after having been stamped with certain letters, were exploded on flat plates of wrought iron. The gun-cotton blocks were placed with the lettered side down, and it was found, that, when the letters were stamped in relief, they appeared in relief on the iron after the explosion, and, on the other hand, when the letters were depressed in the gun-cotton, they were also depressed on the iron plate.

The session this year has been of considerable interest, and the number of communications presented to the section unusually large.

Section C.

[Report not received in time for this issue.]

Section D.

NINETEEN papers or subjects were presented during the sessions of this section by twelve gentlemen, as follows: on Nicaraguan woods, and friction of engines, by R. H. Thurston; on the American system of water-purification, by Albert R. Leeds; a new method of finding an equivalent uniform load, producing bending moments approximately equal to the maximum moments under a moving train, the deflection of girders and trusses, and re-action polygons and their properties (a new general class of graphical polygons suitable for the comparison of the bending moments and shearing stresses in simple girders and single intersection trusses, due to a moving train of wheel weights), by H. T. Eddy; on an improved method for testing metals, by Charles E. Monroe; on the effect upon the strength of iron by subjecting it to a pull while hot, Rankine's solution of the problem of turbines, and downward draught device for a furnace, by DeVolson Wood; on a new high-speed steam-engine indicator, by J. Burkitt Webb; on errors of approximate calculations of the effect of the inertia of the moving parts of a steam-engine, by D. S. Jacobus; on the theoretical effect of errors of observation in calorimeter experiments for determining the latent heat of steam, and improved arrangement of Siemens's platinum electrical pyrometer, by J. E. Denton; on the uniformity of planimeter measurements, by T. C. Mendenhall and John Mack; on mechanical inspection of railway-tracks and results obtained, by P. H. Dudley; on the theories of the lateral pressure of sand against retaining walls, by Mansfield Merriman; on national armament, by J. R. Haskell.

A number of these papers were accompanied by illustrative

models or drawings, and some by both models and drawings. In some cases only a partial treatment of the subject was given, a complete consideration being reserved for another paper. In this way new lines of thought were suggested, and the authors thus indicated their intention of occupying the fields of thought which they thus partially opened up.

The section united with Section B (Physics) for an hour on Friday to hear two papers by J. Burkitt Webb,—one on a new dynamometer, which was illustrated by a working model; and the other on the experimental determination of the re-action of a liquid jet.

On Monday afternoon Sections D and I combined to listen to four papers relating to different aspects of a plan for a Nicaragua ship-canal. The first of these was on the general subject of isthmian transit, by H. C. Taylor; the second, on the engineering features of the Nicaragua Canal, by K. E. Peavy; the third, climatic and sanitary notes on the Nicaragua Canal route, by John F. Bransford; and the fourth, historical and geographical notes concerning the Nicaragua Canal route, by J. W. Miller. The work of the section may be mainly classified under four heads:—

1. Papers recording actual practical work in new fields; as, for example, the paper on the mechanical inspection of railway-tracks, which was accompanied by rolls of diagrams taken upon different lines of railway, showing the condition of their tracks, and from which the interesting and valuable results set forth in the paper were obtained.

2. Papers illustrating new or improved special machines or devices for accomplishing difficult ends. The new high-speed steam-engine indicator, by Professor Webb, illustrates this class. A model and drawings of the instrument were shown, by means of which the theory and operation of the indicator were readily understood.

3. Papers based upon laboratory experiments, like Professor Denton's, on calorimeter experiments for determining the latent heat of steam, in which the results of experiments with two forms of calorimeter were recorded, and made the basis of valuable deductions in regard to the theory and operation of the calorimeters compared.

4. Discussions, suggestions, and criticisms relating to the application of laws and principles, and to methods of research and computation, of which Professor Eddy's paper, on re-action polygons and their properties, is an example.

The papers were generally fresh and stimulating, and clearly aimed to advance scientific thought and attainments, to secure the practical achievement of valuable work upon a scientific basis, and to perfect theories and harmonize them with actual facts and to secure their easy and correct applications in new fields of scientific work. The sessions of the section must have proved of value to all who followed the work done, and many regret that most of the papers must appear in abstract rather than in full in the Proceedings of the association.

Section E.

GEOGRAPHY is by title included with geology in Section E of the association; but geology takes all the attention, and, in the present vigorous condition of geological investigation, geography as a science is almost forgotten. Under geology itself, the work of the International Congress of Geologists and of its American committee received the greatest share of time, as the vice-presidential address of Mr. Gilbert considered the first, and the several reports read by Dr. Frazer introduced the second. There has been apprehension among some that more might be attempted by the congress in the way of authoritative dictation and majority rulings on matters of opinion than would be justifiable in our rapidly advancing science—or, indeed, in any science. The dangers of such a course were well pointed out by Mr. Gilbert: "The proper function of the congress is the establishment of common means of expressing the facts of geology. It should not meddle with the facts themselves. It may regulate the art of the geologist, but it must not regulate his science. Its proper field of work lies in the determination of questions of technology; it is a trespasser if it undertakes the determination of questions of science. It may decree terms, but it must not decree opinions. . . . For science it is not merely illogical, it is

suicidal, to establish facts in any other way than by observation. No vote of the most august scientific body can possibly establish a fact, and no vote can have any weight against a good observation." On these grounds, Mr. Gilbert said, "I am opposed to the classification by the congress of the sedimentary formations, and likewise to the classification of the volcanic rocks, and I also regard it as ill advised that the congress undertook the preparation of a map of Europe, for that — if more than a work of compilation — is a work of classification;" and "a classification, if it has any value whatever, is merely a generalized expression of the facts of observation, and is outside the domain of the voter."

The section was well prepared, after hearing this address, to listen on Friday to several abstracts of reports of semi-official character, by the various individual 'reporters' of the American committee, and submitted to it for approval at the recent meeting at Spring Lake. These were all read by Dr. Frazer, secretary of the committee, before discussion was opened, and their good judgment and conservatism excited general approval. The abstract presented by Dr. Frazer demands especial attention, both from the care in its preparation, and from its including at once a discussion of certain general principles, and of that most difficult of geological divisions, the Archæan; and it is to be hoped that these reports may be given to the association for publication, as expressing the matured opinions of many able workers on questions most frequently before American geologists. Among the paragraphs of Dr. Frazer's report, the following will doubtless be generally commended: "American geologists will acquiesce in the recommendations of the committee by sacrificing individual opinion to a reasonable degree, provided that these recommendations do not hamper the efforts of research by requiring more correlation of beds between the two continents than research can justify." "Until such time as the Archæan rocks can be correlated with each other in distant parts of the earth, it is best that geologists should distinguish them from each other petrographically, without attempting to ascribe more than local chronological value to such distinctions." On the other hand, the recommendation that all pre-Cambrian rocks should be called Archæan savors too much of pre-judgment, especially in view of the recent studies of Irving and Walcott. The possible metamorphism of eruptive rocks was properly emphasized; and, as they are thought to differ more as a result of such changes than by conditions characteristic of their eruption, their classification by composition as indicating age is not recommended.

The most animated discussion occurred over the recommendation that it should be "officially declared that neither the color-scheme for the proposed map of Europe, nor the classification of the eruptives of Professor Lossen, provisionally adopted by the map committee in order to bring out the map, are other than tentative schemes, subject to alteration when their application to the map shall have shown to what extent they are deficient." It was strongly objected by Major Powell that this implied the official adoption of the color-scheme alluded to, in case serious defects were not discovered in its test on the European map, and that it did not sufficiently dwell on the fact that the scheme of colors had been devised only by a committee of the congress, and not by the congress itself. A resolution approving the action of the committee, and hoping for its continuance, was adopted in the evening session; but it may be mentioned that it received only two or three affirmative votes, although the session was well attended at the time.

It is difficult to choose among the many papers read before the section, and we mention only the few that our space allows. Prof. H. S. Williams presented a model paper on the different types of Devonian in America; Mr. Hill gave the results of his recent studies in Texas; Professor Claypole described 'Lake Cuyahoga,' an extinct glacial lake in Ohio; Mr. Walcott contributed a paper on the so-called 'Taconic,' that promises, with his other studies, to bring about accord on this vexed problem; and Dr. G. H. Williams gave an excellent general account of petrographic methods and their application. These titles can only suggest others of like interest that are regrettably omitted from our report.

Section F.

THOSE who think that scientists are seriously divided on the question of evolution would have come to a different conclusion by

attendance at the Biological Section during the meeting of the American Association, just closed. Reputable scientists no longer avoid the question as formerly, or mention it only in defence, but accept it as the basis for the discussion of questions of structure and classification. Dr. Farlow, vice-president of the section, following in harmony with the subject chosen by the president of the association, Professor Morse, chose for his subject 'Vegetable Parasites and Evolution.' Botanists have a smaller basis than zoologists for the study of development, owing to the incompleteness of the paleontological record, especially with reference to the lower plants, to which most parasites belong. The study of different degrees of parasitism has, however, rendered it probable that parasites may have originated at a remote period from non-parasitic plants, first as saprophytes, then as true parasites. The parallelism which exists between algæ and fungi seems also to indicate that the different groups of fungi have arisen from corresponding groups of algæ at different periods in the process of evolution.

The paper of Professor Cope, on the mechanical origin of the suctorial teeth of the *Carnivora*, showed in a striking manner the value which mechanical force may in some cases have as a factor in development. His statement, also, that a given structure may or may not be the best which could be devised for performing its particular function, but that it must be such as could be developed from a pre-existing form, is one which, if earlier understood, would have saved much misdirected effort.

Among the other papers presented, that of Professor Cook on the antennæ-cleaners of *Hymenoptera*, the series of structural papers by Dr. Beal, that of Dr. Schrenk on *Brasenia peltata*, and the papers on morphology by Professor Baur, were excellent examples of the present methods of study. The paper of perhaps the most practical importance was that of Dr. Rusby, on the cultivated cinchonas of Bolivia.

In the treatment of the topics relating to classification, there was manifested a tendency to restrict the number of species and increase the number of varieties. In regard to terminology, there was exhibited on one or two occasions a decided opposition to the introduction of comparatively unimportant new terms.

The proportion of botanical to zoological papers presented before the section was less than last year, although the attendance of botanists was greater. There is still a general desire, on the part of the botanists, to confine the discussions and short papers chiefly to the botanical club, and the necessity is felt of providing more time for that purpose. Among the work of the club was the appointment of a committee, consisting of Drs. Vasey, Britton, Watson, Morong, and Halstead, to devise a system for the exchange of specimens.

One of the most enjoyable features of the meetings was the excursions provided by the citizens of New York and the local societies. These gave an opportunity for the members to become acquainted, and to compare personal notes. Of especial interest was the excursion of the botanical and entomological clubs to Sandy Hook, which included an informal 'field-meeting' on board the boat during the return. Much is due from botanists to the Torrey Botanical Club, which, besides the delightful entertainments provided, furnished sets of the local plants to those in attendance.

Section H.

THE meetings of this section are always interesting on account of the great variety of papers read. At the present meeting the discussions were more lively than they used to be, and this is due to the skilful vice-president, Dr. D. G. Brinton, who encouraged discussion in every way, and, by giving summaries of the doubtful points, elicited remarks from all interested in the subject.

Among the different classes of papers, archæological ones take a prominent place. This is somewhat remarkable, when we consider that in many parts of America we have still the very best opportunities of studying the natives themselves; but the antiquity and doubtful origin of relics have always proved a stronger incentive for scientific remarks than the living neighbor, to whose customs and strange appearance we become accustomed. The most important one among this class of papers was Professor Putnam's report on the purchase of the serpent-mound of Adams County, O., by a number of ladies,

who presented the deed to the trustees of the Peabody Museum of Cambridge. Professor Putnam's report, in connection with a brief letter from Miss Alice Fletcher, led to an important discussion on the preservation of mounds and relics, and the opinion was expressed unanimously that some step must be taken in this direction. In order to impress the United States and the State governments and legislatures with the importance of this matter, it was moved that the association, in a general session, appoint a committee whose task it should be to take the necessary steps in this direction. Mrs. Stevenson, president of the Ladies' Anthropological Society of Washington, and Miss Fletcher, were elected members of the committee. Major Powell's remarks on the difficulties which would be encountered in carrying out the proposed scheme, and the fact that attempted 'preservations' had sometimes ended in actual destruction, led to the election of a second committee of five members, for impressing the State historical societies and legislatures with the importance of the matter, and inducing them to preserve the relics in their territories, while the former committee will draw the attention of Congress to those situated on public lands.

The desire to draw greater attention to archæology was also characteristic of Prof. Thomas Wilson's paper on the state of archæology in western Europe. He showed that in America, though the interest of the public is increasing, nothing equal to the work of European nations has been done. Scandinavian archæologists ought to be our teachers in this line of research: they were the first to work out scientific methods and to undertake researches on a great scale. Professor Wilson laid great stress on the influence of European societies and scientific institutions and of the support of the government upon the rapid development of prehistoric anthropology.

The papers and discussions on archæological subjects showed that a closer connection between geologists and archæologists is very desirable, or, rather, that the student of archæology ought to be conversant with dynamical geology, more particularly with the influence of water and wind upon the earth's surface. This is the only method to avoid serious errors and to reach satisfactory results. Prof. C. C. Abbott's method, which he explained during the sessions in numerous remarks and in his paper on evidences of pre-Indian occupation of New Jersey, makes it clear that this is the most satisfactory method of study. Of course, the form of the implements must also be considered. Dr. Brinton's suggestion, that the occurrence of simple implements and of compound implements (i.e., those in which the worked stones are attached to handles) should be made a principle of division of the paleolithic age, may be accepted in so far as we must suppose, *a priori*, that simple implements were the earliest inventions of developing mankind. It is, however, doubtful whether the finds really justify a separate consideration of both ages. The important question of the age of American antiquities, and whether they belonged to the Indians inhabiting the continent at the time of the discovery or to a pre-Indian race, received its proper share of attention. Besides Professor Abbott's paper, which was mentioned above, Mr. G. N. Perkins's remark, that in the Champlain valley a steady development of forms, from the most ancient to the recent ones, may be observed, deserves to be mentioned.

The desire of tracing the earliest history of man in America, which is the most vigorous inducement of American archæology, was also the basis of Horatio Hale's paper on the true basis of ethnology. A few weeks ago Major Powell had expressed, in a letter to *Science*, the opinion that there can be no ethnology, as all attempts to classify mankind have failed. This refers to ethnology, as defined by Powell, as the science treating of the classification of mankind. Professor Hale opposes this opinion, maintaining that the languages afford a sufficient basis for the classification of man into races. Major Powell, in defence of the position he had taken, said that languages, customs, and religions were only adhering to the individual, while the anthropological character was the only constant phenomenon. But here, as well as in the ethnological characteristics of races, admixtures of blood had made it impossible to reach satisfactory results. This elicited the important remark from Dr. Brinton, with which we heartily concur, that language and religion of the individual may be easily changed, but that tribes and races do not so readily adopt new social institutions and

new languages, and that not the individual, but the tribe, is the important object of study. His opinion is, that the psychology of nations is the true basis of ethnology, and we may add that the history of civilization is its ultimate aim.

Methods of ethnological researches are making steady progress. This is shown by the papers of Dr. Wesley Mills, on the study of a small and isolated community in the Bahama Islands; and by that of Mr. Steward Culin, 'China in America.' The former is a contribution to the solution of the problem of the influence of monotony in climate and social institutions upon man: the latter treats of another interesting question which is of the greatest importance in studying the history of mankind,—the constancy of ethnological peculiarities, and the influence of one people upon another. Papers treating of the ethnology of certain tribes were comparatively few. Great interest was excited by two specimens shown by Mr. G. F. Kunz, — a gigantic jadeite adze from Oaxaca, Mexico, which shows signs of being cut from a boulder by the use of a string, and is beautifully carved and polished; and a very remarkable human skull of rock crystal in natural size, probably of Mexican origin. On this occasion we had the pleasure of hearing the assumed similarity between the Mexican and Japanese arts thoroughly refuted by Mr. Tatui Baba. In fact, the task of proving the similarity rests on the shoulders of those maintaining its existence.

The last paper we have to mention is that by Mr. J. Jastrow, on sensory types of memory and apperception. He discussed apperception as brought about by visual and audital perceptions, and treated of the connection of both kinds of perceptions in many individuals. He referred to the important bearing of this question on education, as different methods must be applied for the two classes of individuals. He gave some methods for determining the prevailing faculty. His opinion is, that the visualists form the more numerous class, but we believe that the universal existence of language shows the importance of auditalism. Researches in experimental psychology, such as Mr. Jastrow undertakes, are not yet carried on to a great extent in America, but we may hope that in course of time they will become an important feature of the sessions of the Anthropological Section, as this branch of science is one of the foundations of the psychology of individuals and of nations.

Section I.

[Report not received in time for this issue.]

THE GEOGRAPHICAL MOVEMENT IN ENGLAND.

I WAS asked some time ago to furnish *Science* with an account of the results of the efforts of the Royal Geographical Society towards the improvement of geographical education in England, and to give some idea of the character of the collection of appliances exhibited in London and elsewhere in connection with this movement. I have waited till now in order that I might be able to state positively that so far the society's efforts have met with almost complete success. The University of Oxford has just appointed a reader in geography; not only so, but the appointment has been given, I believe I am safe in saying, to the only one among the numerous candidates likely to carry out the views of the Geographical Society as to what the geography of the future should be. Mr. Harford J. Mackinder, the new reader in geography, is a young graduate of Oxford, who has taken high honors both in science and in history, and thus is qualified to treat geography adequately on all its sides. As one of the lecturers in connection with the Oxford University extension scheme, he has attended large and enthusiastic audiences in various English provincial towns. What his conception of geography is may be seen from the paper which he read before the Geographical Society, and which is printed in the Proceedings of March, 1887. Cambridge University has decided to follow the example of Oxford in the beginning of next year, and meantime has requested the council of the Geographical Society to nominate one or more of its members to lecture on the subject in the autumn of the present year.

Thus it will be seen, that, so far as our two great universities are concerned, the recent efforts of the society have been completely successful: for it must be borne in mind that the council of the society have all along felt, that, unless geography were recognized

at our universities, it would be hopeless to attempt to make any impression, on our higher schools at least. Now, with two good men, working on right lines, and filled with contagious enthusiasm, at our two great universities, we may confidently expect that improvement will filter downwards.

It is nearly twenty years since the society felt compelled to raise geography from the low level it has occupied in English education. It memorialized both Oxford and Cambridge, but its memorials were scarcely even honored by a reply. Medals were offered for competition among certain (about fifty) selected schools of the higher grade; but after sixteen years these were dropped, from lack of competitors. Three years ago the council resolved to institute a thorough inquiry into the whole question of the position of geography at home and abroad, and did me the honor of appointing me to conduct the inquiry. The results of the inquiry have been published in the form of a report, which has been referred to at some length, on various occasions, in *Science*, so that I need not analyze it in detail here. The general conclusion was, that except in a few rare cases, depending mainly on the tastes of individual teachers, geography has no substantial place in English education. In many of our higher schools it is not taught at all. In most cases where it is taught, it is the barrenest of studies, consisting in the learning of long lists of names and figures. Rarely was any attempt made to show the intimate connection between physical and political geography, the latter being taken almost invariably in its narrowest and meagrest acceptation. In our elementary schools, on the other hand, some attempt is made, under the guidance of the Government Code, to make the subject a reality; but even here it is by no means compulsory. On the continent, again, especially in Germany, geography is everywhere taught, in every grade of school, and throughout nearly all classes in all schools. While the position is not the same throughout all the provinces of Germany, and while here also a good deal depends upon the teacher, still the subject holds a high position, and is taught after intelligent methods. It was everywhere admitted that improvement in Germany has been largely due to the establishment of chairs in the universities, of which there are now a dozen. In Austria, France, Italy, Holland, Belgium, Norway, Sweden, the position of the subject and the methods of teaching were far ahead of what we find in England. The Education Bureau of the United States very kindly instituted, on behalf of the society, an inquiry into the position of the subject in the schools there. Unfortunately the voluminous documents thus collected did not reach me until after my report was written; but, from what I gather from the documents, I fear American schools, so far at least as the methods and standard of the subject are concerned, are not very far ahead of those of the Old Country.

There can be little doubt that the society's recent action, apart from the results in the universities, has had considerable effect on the schools generally. It has drawn wide attention to the subject; not only laid bare its neglect and the poverty and wretched quality of the appliances used in teaching, but has set before the public a higher standard than was dreamt of before, and indicated how the despised and rejected subject might, with proper methods, become one of the most fruitful fields of scientific-historical research. It has been shown that geography has a field uncovered by any other department. Of what is known as physical geography, — the topographical surroundings of humanity, — there is not much to complain: its facts and principles are pretty well known, and fairly set forth in numerous text-books. It is when we come to apply these facts to humanity, to deal with their bearings on the development of man in communities, that we find so much to desire. Mr. Mackinder defines geography as the physical basis of history: may we not extend this, and say it is the physical basis of all the activities of collective humanity? At present 'political' geography consists mainly of a catalogue of States and their subdivisions, their routes, towns, and 'chief manufactures.' If 'political' were taken in its wider and more correct sense, and political geography treated as the department of knowledge that dealt with the development of States so far as that is influenced by geographical conditions, then it is evident that both as a branch of knowledge and as a discipline we might expect the most fruitful results. What are the lines on which this new geography should run may be learned from the lecture of Mr. Mackinder, referred to above; from the lecture de-

livered in connection with the society's exhibition, and presented in one large volume along with my report; and from an admirable paper by Dr. Boas in *Science* a few months ago. To attempt to develop the subject further here would take more space than can be allowed me. Suffice it to say that this aspect of it is rapidly gaining ground in England, both in our schools and among thoughtful men generally, and I am confident will make more rapid headway in the future.

It was part of my duty to collect specimens of the various appliances used in teaching geography at home and abroad. The collection thus formed so grew on our hands that it developed into a somewhat formidable space when displayed. This collection was on view in a large hall in London in the end of 1885 and beginning of 1886. During 1886 it was sent by request to Manchester, Edinburgh, and Bradford, and at each place attracted large numbers of visitors, chiefly teachers and those interested in education. The collection was not meant to be a model one, but only typical of the various appliances in use. It therefore contained good and bad; more of the latter, I fear, than of the former. The most prominent feature was the collection of wall-maps from the leading European countries. Besides these, there were relief-maps of all sizes, models, globes, telluria, text-books, atlases, and hand-maps, and a variety of other odds and ends. The principal result of this exhibition was to bring out in strong relief the poverty of English productions of this class, especially when compared with the variety and excellence of the appliances used in Germany. English wall-maps, for example, like English text-books and English geographical teaching generally, seem mainly intended to record names. Physical features are entirely subordinate, and special physical maps are rarely met with in our schools. High and aimless coloring is the most prominent feature of our maps and atlases; and these, with our text-books, reflect painfully the low standard of the subject which exists here. German maps, again, while capable enough of improvement, are in execution, instructiveness, intelligence, and accuracy, far above any thing we have here, except in one or two cases. In the best German schools we find wall-maps always in pairs; a physical map, with physical features simply, but permanently laid down, and no names; and a political map, with the physical features subordinate but clear, in which the political features and names are laid down. Some of the best wall-maps come from Winterthur, near Zürich, from the establishment of Randegger, and are almost perfect specimens of cartography. Even Italy, following close on the heels of Germany, furnishes its schools with better maps than does England; while France, though improving, is not often very far ahead of ourselves. To Italy we owe some of the best large relief-maps, — maps accurately executed from surveys, and with the minimum exaggeration of altitudes. At the same time Delagrave of Paris sent some beautiful specimens of large relief-maps by Mlle. Kleinhaus. The great model of the Monte Rosa group, executed by Imfeld and Heim of Zürich, was the gem of our exhibition, and has been secured for the science collection at South Kensington. Unfortunately its price places it beyond the reach of most schools. But reliefs of a glacier, of a volcanic island, and other subjects, by Professor Heim, are cheap enough, and of the greatest utility in teaching physical geography. I am glad to say that not a few teachers were induced to invest in copies. The globes were mostly too small. No globe under eighteen inches diameter is of much use for the purpose for which such an article is ordinarily used. The larger the better, but unfortunately large globes are too dear for ordinary schools. We had one or two relief-globes, but the exaggeration of altitudes is so great as to render such globes pernicious. We had some very large black slate globes of foreign make and wonderfully cheap, with only the lines of latitude and longitude marked. These globes, in the hands of good teachers, can be put to excellent use in a variety of ways. The ordinary planetaria and telluria are mere toys. Their mechanism is so coarse and elaborate as to convey the most erroneous conceptions to young pupils. The most useful thing of this kind was a simple terrestrial globe on a revolving arm, with a small glass globe in the centre to hold a candle, which represents the sun. But any teacher who knows his business, can, with a simple ball or an orange, and a lamp, show all that the most elaborate tellurium can illustrate, and with much less risk

of conveying misleading ideas. We had a simple and highly instructive arrangement devised by Mr. Francis Galton, to whose initiation I may say the whole of this geographical movement is due, to show the relative sizes of sun and earth and moon. We supposed the distance between sun and earth to be reduced to 56 feet. On a wall we fixed a disk of cardboard colored yellow, 6 inches in diameter, for the sun. On a table 56 feet away we had a pellet of wax, .056 of an inch in diameter, suspended by a hair to the end of a splinter of wood 1.68 inches in diameter, to represent the earth. At the other end was another pellet, .015 of an inch in diameter, to represent the moon. This arrangement costs nothing, and can be adapted to any building. In fact, there is ample room for a variety of demonstration of the kind in connection with geographical teaching, as well as of experiments to illustrate geographical facts. Thus the crumpling of the earth's crust might be illustrated by bringing lateral pressure to bear on a plastic material; and already in a few English schools sand and clay are used to build up the physical features of a country or region. The magic lantern also may be used with great effect to produce large-scale maps on the screen, to exhibit special features, and to bring pictures of typical landscapes before the eyes of the pupils. One of the most interesting and novel of our exhibits consisted of several series of geographical pictures from Germany; that is, pictures whose special object is to show the characteristic features of the various regions of the globe, and the typical forms assumed by the leading classes of phenomena with which geography deals. The best of these pictures is the series of about thirty oleographs published by Holzel of Vienna, and which are now coming into use in this country. Above all things, such pictures must be accurate, and therefore good large-scale photographs are often to be preferred, — such photographs, for example, as are produced by the United States surveys and by private enterprise, — of some of the most striking features in American scenery. For teaching purposes, however, it should be remembered that it is not extraordinary features that are desired, but typical aspects of the earth's surface, — ordinary mountain forms, a prairie, a delta, a tundra, a steppe region, a coral island, a sandy desert, and so on.

The text-books and atlases which were exhibited were analogous to the wall-maps. The English text-books were mostly too large, and too crowded with names and tables, and made no attempt whatever to show the intimate relation between all sections of geography, and the influence which man's geographical surroundings has upon his social and political development. The German text-books are comparatively small; contain mostly heads of subjects, the filling-up being left to the teacher, who has generally had a thorough training in geography at the university or the normal school. I am sorry I cannot speak very highly of American text-books. As a rule, the American text-book is combined with an atlas and picture-book, — an arrangement which I do not consider a happy one. Neither text, nor maps, nor pictures, are any better shown than we have on this side; and even with Guyot's geographical manuals we were much disappointed.

Altogether the collection of geographical appliances has proved most suggestive and instructive. Reform has already begun. Many schools are now using Kiepert's wall-maps, and publishers are making haste here to supply the glaring want of good text-books, atlases, and wall-maps. Teachers have been stirred up to recognize existing deficiencies, as well as the undreamt of capabilities of geography when treated liberally and intelligently. They see that in geography, as in mathematics, a special training is required if it is to be taught effectually. The society appeals to the elementary teacher by offering a series of prizes on the basis of the examinations of the training-college students, and many of the school boards are instituting radical improvements in their geographical appliances. Out of the collection, which is once more in London, we are forming a small typical collection for exhibition to any who may wish to know what are the best things in any department. This collection is of course very small to begin with; but we hope, that, as improvements are introduced, we may be able to extend it.

Altogether I hope it may be seen from these notes that the Geographical Society has at last succeeded in raising geography from the slough in which it has lain so long in this country; has not

only initiated great improvements in the teaching of the subject, and obtained its recognition at our great universities, but has shown that it is eminently capable of becoming a fruitful and instructive medium of research, worthy of taking its place alongside of other departments of scientific investigation. J. SCOTT KELTIE.

THE STUDY OF GEOGRAPHY.

THE *Ausland* of May 9 contains an extract of A. Stauber's essay on the promotion of the study of geography, which carried the prize offered by the King of Belgium. The author discusses the methods which ought to be applied in primary teaching, in high-schools, and in colleges. In the primary grade, the method is that of object-teaching. First, the geography of the child's own country is taught, beginning with the nearest surroundings, the school-house or home, the village or city, the county, and so on. The close connection between natural history and geography must be kept in mind by the teacher, who is warned against overburdening the children's brains with names and dates. The drawing of maps and the use of charts are recommended; but Stauber remarks justly that not too much weight should be laid on the drawing of maps, which must only be practised as a means to impress the configuration of the earth's surface more effectively on the child's mind. In the upper classes, an atlas ought to be used, but it is important to select maps which contain the proper amount of material and show the geographical features of the country clearly and simply. After the native country has been thoroughly studied, the geography of the native continent, and later on that of the other continents, is taught.

In high-schools and colleges the analytic method gradually takes the place of the synthetic. The reading of travels is recommended as a means of making the study more attractive and of preventing its becoming a mere memorizing. The connection between natural history and geography must always be emphasized, and characteristic objects ought always to be shown. But, in order to be able to do this kind of work, teachers ought to be thoroughly conversant with the problems of geography. This can only be accomplished by the study of geography at a university. Therefore the establishment of professorships of geography is demanded. At the present time there are seventy-five such professorships at European universities. In Prussia, every university has its professor of geography; at other German universities there are lecturers. In England, geography will be taught in Oxford and Cambridge, as lecturers were appointed a short time ago. In Belgium, Greece, Portugal, Sweden, and in the United States, the science of geography is not taught by specialists, but, when it is taught at all, only incidentally.

Among the manuscripts which received honorable mention is an American one by Prof. Richard Owen of New Harmony, Ind. We are indebted to the author for a statement of his proposals.

The first principles of his method of teaching are, that he only makes one step at a time from the known to the unknown, and that the eye instructs more than the ear, and that consequently, whenever practicable, the object that is being described, or a good representation of it, should be shown. As a consequence of his first principle, he presents only one thing at a time. For instance, he uses a separate outline map, 1st, for the general outlines of the continents; 2d, for the same with mountains only; 3d, for the same with rivers added; 4th, for all these with political divisions. He depends chiefly upon numerous plastic relief-maps as a system of instruction, and shows that these can be made very economically, and that children of from ten to twelve years of age take great interest in their construction. He begins his course in the same way as Stauber, by having the student study the geography of his home, and by having him make the plan and model of the school-house, or of his own house and garden, by measurement and according to a definite scale. Then he proceeds to teaching the topography of his town, county, state, and finally of the United States.

Using the globe, he begins to give his pupils an idea of the earth being nearly a sphere, by various demonstrations, and by calling in a traveller who testifies that he returned to the place of beginning of his travels by steadily travelling west, and thus teaches the elements of mathematical geography. In teaching, he uses numerous maps and diagrams, showing the phenomena of physical geography, and models to explain the forms of the earth's surface.

HEALTH MATTERS.

Evergreens and Consumption.

AT a meeting of the American Climatological Association, held in Baltimore, Dr. Loomis of New York read a paper on evergreen-forests as a therapeutic agent in pulmonary phthisis, in which he said that it had long been known that similar climates, as determined by geographical and meteorological conditions, have different therapeutic effects. It is becoming more apparent that there is some relation between the development of organisms and atmospheric conditions. Cold and high altitudes render the air aseptic; but the degree of cold and the height required are so great, that clinically it is not possible to derive much benefit from this fact. The effect of a purely aseptic air upon ulcerative processes is not so great as the effect of an atmosphere which is aseptic on account of the presence of antiseptic agents. The belief in the good effects of pine-forests in cases of phthisis is quite unanimous, and the clinical evidence in favor of their beneficial influence is unquestioned. The atmosphere in such regions is not only aseptic, but also antiseptic. Such an atmosphere contains considerable turpentine-vapor, and we should therefore expect it to contain a certain amount of peroxide of hydrogen. The majority of cases of phthisis die, not directly from the lesions in the lung, but from the secondary septicæmia and pyæmia which are set up. It is impossible to apply to the ulcerations within the lung the antiseptic washing and dressing that is employed in external lesions; but, if an antiseptic atmosphere can be obtained, we may hope to counteract the secondary poisoning. Such an atmosphere will not destroy the bacilli, but it will accomplish much in the way of arresting the suppurative process. The atmosphere in the region of evergreen-forests acts in a manner similar to the antiseptic agents which are successfully used to arrest suppurative processes in other portions of the body; and, in all probability, the active agent is peroxide of hydrogen resulting from the oxidation of the turpentine-vapor. While it is not possible for every one suffering with pulmonary phthisis to go to an antiseptic atmosphere, yet it is possible to render the air of any particular locality antiseptic. In the course of the discussion of Professor Loomis's paper, Dr. Cohen reported excellent results in the way of alleviating the symptoms of phthisis by the inhalation of terebinthinate substances, especially when associated with the peroxide of hydrogen, or oxygen.

BOOK-REVIEWS.

The Republic of the Future; or, Socialism a Reality. By ANNA BOWMAN DODD. New York, Cassell & Co. 24°.

THIS is not a pretentious book, but a pleasantly written series of letters "from a Swedish nobleman living in the twenty-first century to a friend in Christiana." It appears from the letters that the American Republic has been dynamited, and upon its ruins a socialistic republic established. The year of the revolution is 1900, and, by placing the date of the letters late in the twenty-first century, the author assumes sufficient time to have elapsed to fully develop the characteristic society. The Swedish nobleman, recognizing the evils of society based upon the principle of competition, and learning that the Americans (that is to say, the Germans and Irish, who have exterminated the English stock) have succeeded in forming a socialistic society, pays a visit to this strange people for the purpose of studying their institutions. His letters are descriptive both of what he saw and of what he thought.

Such is the plot of the book, and it certainly is an attractive one; but, to be useful as an argument, the ideas from which it starts must properly represent the socialists, whom it undertakes to criticise. This, however, it fails to do. The author is either ignorant of the writings of the best socialists, or has deliberately chosen the views of inferior men in order the more easily to ridicule them.

It is right that such a charge as this should be sustained by specific statements, and we will call attention to three points in which these letters fail to appreciate or to understand the theory of socialism.

First, It is assumed that socialism demands absolute equality of

condition: for example, only homely women are permitted to become educated, lest the equality of attractiveness should be destroyed; and much more of the same sort. This is foreign to the spirit of socialism. "It is not equality of condition, but equality of opportunity, that is demanded. The rule of distribution is that each shall share in the good things of life according to his efficiency as a producer. It is communism which says, "To every man according to his needs:" socialism says, "To every man according to his ability."

Second, It is assumed that government directs methods of expenditure as well as methods of production. In this Republic the houses are built according to law. Dress, too, is prescribed. But all this is a mistaken notion. It is not found in the writings of representative socialists. Indeed, the opposite is expressed. A sharp line is drawn between wealth used as capital, and wealth used for giving enjoyment to the consumer; and there is no suggestion that law should prescribe how this second class of wealth may be used.

Third, The author of these letters says that 'Progress and Poverty' is the Bible of the new republic. It is read from the rostrum of the temple erected to ethical culture, — a temple, we are told, which stands without a steeple. Now, it seems hardly possible that our author could have read 'Progress and Poverty' with care, or the many contradictions which exist between the views of Mr. George and those realized in the socialistic society described, would have been recognized. For example, socialism charges upon commercial competition all the evils of modern society: it is therefore quite right to say, as our author says, that in a socialistic society competition in business-matters finds no place. But Mr. George does not desire to exclude competitive action: indeed, he is a firm believer in the doctrine of *laissez-faire*. He is a freetrader. He says, make one simple change in the system of taxation, and the natural laws of trade will insure justice. No socialist would recognize him as more than a temporary leader. He does not go far enough. He proposes only to nationalize land: the socialist would nationalize both capital and land.

This review has taken the book reviewed to be a serious argument against socialism. As such it is worthless, because it does not properly apprehend what socialism means. The reviewer does not call attention to this because he is a believer in the programme of social reform set down by Blanc and Lasalle, but because he feels that every witticism made at the expense of truth assists the cause which the writer of this book undertakes to oppose. It may be that this point of view is incorrect. Possibly the book was intended to be merely a bit of facetious writing. As such it is a success. It is bright, in good style, and full of pleasing imagination; but for an argument it is too full of imagination.

HENRY C. ADAMS.

The Electric Transmission of Energy. By GIBBERT KAPP, C.E. New York, Van Nostrand. 12°.

THIS book forms one of the 'Specialists' Series,' which is a series of handbooks for students and practical engineers. It begins with the customary *résumé* of the elements of electrodynamics, together with a brief study of the nomenclature of the science, and the units used in electrical measurements. While this part of the work is, on the whole, well done, it is evidently the product of the so-called 'practical' mind, rather than that of the educated or well-informed electrician.

A few curious statements occur, which illustrate the difficulty with which makers of handbooks contend in attempting to absorb, or at least to represent, purely scientific conceptions. As an instance the following may be quoted: "The potential of a body is its property of allowing energy stored up in it to become potent, that is, to do work." An investigation of the ideal motor and the ideal system of transmission is followed by an examination of the various types of armatures and the principles which govern their action. The field-magnet is then taken up, its many forms illustrated, and some attention is paid to magnetic resistance, self-induction, etc., use being made of 'characteristic curves' in the development of the principles involved. The subject of the efficiency of the motor is treated at some length, and various systems of transmission are described, including some of the applications of electricity to railway locomotives.

tion. Tolerably complete discussions of some of the principal trials of long-distance transmission are also included, together with some of the numerical results of these trials. The volume contains much that is interesting and useful to students of electricity, and will be of undoubted value to those who are engaged in its practical application. The American reader will look in vain for any account of the more recent and highly important improvements in motors and systems of transmission which have originated in this country. This will not be a matter of regret to any one who has secured a copy of the next book under review.

The Electric Motor and its Applications. By MARTIN and WETZLER. New York, W. J. Johnston. 4°.

MADE up largely of articles contributed by its authors from time to time to the *Electrical World*, by far the greater portion of this volume is devoted to an exposition of the results of American activity in this field. Again is found on the first page the usual cut showing Oersted's experiment, and the usual brief and unsatisfactory presentation of elementary principles, without which it seems impossible for a book on electro-technics to make its appearance. Not much can be said in favor of this well-nigh universal introduction. The reader has but to turn over a single leaf to find himself involved in the use of such terms as 'counter-electromotive force,' 'Lenz's law,' 'the law of Jacobi,' and many others, for the proper understanding of which little assistance has been rendered in the short study of 'theoretical principles.' Books of this class are written for and read by those who already know more than the elements of the subject, and their presentation might safely be omitted.

Two chapters are devoted to an account of the earlier experiments with motors in Europe and America, and in the division of space Europe gets five pages to America's sixteen. A chapter is given to the theoretical consideration of the problem of the electrical transmission of power, followed by a very short one on the electric railway and tramway in Europe, and a very long one on the electric railway and street-car lines in America. The use of storage-batteries with electric motors on street-railway lines concludes the first half of the book, the remainder of which is devoted to a consideration of the industrial applications of electric motors in Europe and America. Much the largest share of space is given to American systems and inventions, and many of the most important 'plants' now in operation are described. The work is largely historical and descriptive in its character, a scientific treatment of the subject being only attempted in a single chapter.

As a *résumé* of what has been thus far accomplished, especially in this country, in the development of one of the most promising fields of applied electricity, it will be found to be very interesting and useful. Illustrations form a prominent feature of the work, there being as many as two hundred, many of which occupy an entire page. Several of the largest and most elaborate illustrations are intrinsically of very little value, being merely 'pictures' which are in no way especially related to the real object of the work, and convey no useful information. Of such may be mentioned a full-page 'winter view' of an electric street-railway, in which the only thing suggestive of electricity is a possible lightning-rod upon a building in the background.

Electric Light Primer. By CHARLES L. LEVÉY. New York, The Author. 8°.

THIS little primer consists of thirty-five octavo pages of good, bad, and indifferent matter relating to the management of dynamos and electric lights. The 'practical man' here has full sway, and he wisely declares in his preface that "it is not supposed that these pages will be of any value to the electrician."

They would have been of much greater value to the workmen and engineer in charge of electric machinery if they had been prepared by one who really understood what he was writing about. As it is, a good deal of knowledge of the subject is required to separate the good from the bad.

The Storage of Electrical Energy. By GASTON PLANTÉ. New York, Van Nostrand. 8°.

THE work before us includes the principal researches of Planté, contributed to the French Academy, and various scientific periodicals, from 1859 to 1879. The full history of the secondary battery, as it grew in his hands, will be found in the first two or three

chapters, and the construction of various forms is given with great exactness of detail. His use of the transforming rheostat for the purpose of obtaining electricity of 'high tension' is described at length, together with many practical applications of this device. The volume includes an account of Planté's experiments on the nature of the electric discharge under high tension, and also his application of these researches in the explanation of many natural phenomena.

While many electricians will be unable to agree with him in his conclusions, all will be glad to find the results of his labor in so compact and usable a form as that in which they are presented in this volume.

Electricity treated Experimentally. By LINNÆUS CUMMING. M.A. London, Rivingtons. 12°.

ALTHOUGH an excellent little book, it will be something of a disappointment to the many teachers and students who have for several years made good use of the 'Theory of Electricity,' by the same author. The disappointment will grow out of the fact that it is a less complete and comprehensive treatment of the subject than will be generally looked for. It contains the substance of a series of experimental lectures given to senior boys in Rugby School, and not much preliminary mathematical training is assumed. In a few of the discussions a knowledge of mathematical principles as developed in the author's 'Theory' is desirable, but in such cases the fundamental formulæ may be taken for granted or the articles may be omitted. Magnetism is first studied, and then a relatively large space is devoted to frictional electricity.

Book III. is devoted to voltaic electricity, and fills rather more than one-half of the entire volume. At the end of each general subject will be found an excellent list of problems and exercises; and, as the author says, the book is educational, and not technical, in its plan and character. There are doubtless many courses of study into which it will fit with extremely satisfactory results.

Facts and Fictions of Mental Healing. By C. M. BARROWS. Boston, Carter & Karrick.

THE writer of this book states that he has not himself been engaged in mental healing, but has enjoyed exceptional facilities for studying its operations, and investigating a great number and variety of alleged cures. He is convinced by the results of many careful tests, that, if the mental treatment of disease be not all that its most sanguine advocates picture it, it is a powerful therapeutic agent when skilfully used, and based on a philosophy which has done the world incalculable good. In presenting the claims of this method of treatment, he has tried to make it apparent that there is a sound physical reason why well-directed thought should help the sick as much as medicine does; that a mental cure is nothing mysterious, but a natural event, which could not but take place under favorable circumstances. He disclaims any desire to compel the reader's assent, but his aim has been to awaken thought and deepen the reader's interest by fairly stating the evidence both for and against mental healing, and let him decide for himself. There are facts that prove the possibility of such cures beyond a peradventure. There are fictions, also, which must be abandoned if mental healing is to get and retain a hold upon the popular attention. It has a philosophy that will bear the intensest light that can be thrown upon it; and the subject needs only to be presented to educated, thoughtful persons in the right way, to appeal to their intelligence and convince their reason. Under the title 'Mental Healing' the author of this book includes 'spiritual healing,' 'prayer and faith-cure,' 'metaphysical healing,' 'Christian science,' and 'mind-cure.' In an introductory survey, the wonderful reputed cures are referred to of Dr. Newton, who, in Boston, in 1859, restored the sick to health by the laying-on of hands; of Elizabeth Mix, an ignorant colored woman of Connecticut, who performed many faith-cures; of Dorothea Trudel, who, in 1861, in Switzerland, worked remarkable cures of cases given over by physicians as utterly hopeless; and of others which want of space will not permit us to quote. The objection is often made to the various forms of mental healing, that there is no positive evidence that the cures are what they are claimed to be. Most of them, it is said, are performed by persons unskilled in the science of pathology, and not qualified to judge whether the subjects of their treatment really suffer from the

alleged disease, or, if actually sick, are fully cured. The best answer that mental healers can make to this charge is, that, whether right or wrong in their judgments of what ails their patients, they act precisely as any sensible physician would under like circumstances, and try to relieve the disease. In a chapter on the creeds of mental healers, we find that these differ to a considerable degree among the different schools or sects: for these points of difference we shall have to refer our readers to the book itself. Mr. Barrows states that it would not be putting the case too strongly to say that the theory of the mental healers, carried to the highest point, traces every form of disease, as well as sin, to mental causes, which may be removed and the effects destroyed. Even death itself they hold to be an illusion, that may be dispelled by a full reception of the truth and consequent right thinking. Thought creates a world for each one of us; thought makes the body; and all physical phenomena, whether of disease or health, are due to thought. In commenting on this view of the subject, the author says, that, if utterances like these seem extravagant, it should not be forgotten that a new truth — and every truth we grasp is new to *us*, though old to all the world beside — is apt to intoxicate its possessor, and become to his infatuated sense the universal solvent of the enigmas of life. Time and experience may safely be left to adjust the value of these claims; but meanwhile it is not the mark of wisdom to fear or ridicule them. We must confess, that, after a very careful reading of Mr. Barrows's book, we are as much in ignorance of just what is the basis of the mental healer's claim as we were before. They seem, indeed, to be divided into more sects or schools than those usually called physicians. Some of their claims, as quoted by Mr. Barrows, are simply absurd. Take this one, for example. It is an extract from one of the text-books of mental healing prepared for the guidance of students who intend to practise that method. If the case to be treated is a consumptive, begin your argument by taking up the leading points that this disease includes, according to belief, showing it is not inherited, that inflammation, tubercles, hemorrhage, and decomposition are but thoughts, beliefs, mental images before mortal mind, not the immortal Mind: hence they are not the truth of man, and should be treated as error, put out of mind, and then they will disappear from the body. That Mr. Barrows is a firm believer in mental healing is apparent from his writings; and that he himself believes that some of its teachers and practitioners make ridiculous claims for it, also seems to be clear. We are inclined to agree with some of the writers to whom he refers, — with Dr. Buckley, for instance, who acknowledges that most extraordinary recoveries have been produced, some of them instantaneously, from disease in some cases generally considered to be incurable by ordinary treatment, in others known to be curable in the ordinary process of medicine and in surgery only by slow degrees, — but can hardly be convinced that the case quoted from 'Nature and the Supernatural,' by Rev. Horace Bushnell, ever occurred, certainly not under just the circumstances as given, where a child ill with scarlet-fever was, immediately after a prayer made by his father, completely cured, so as to pronounce himself quite well and ask for his dinner. Mr. Barrows refers to the late Dr. Austin Flint with great respect for his opinions; and if mental healing, as he states, simply emphasizes the highest doctrines of the medical schools as announced by Dr. Flint, then we willingly acknowledge that there is much in it to demand consideration and recognition. Dr. Flint, in one of his addresses, said, "Let it be popularly known that most medicinal agents are curative, not directly but indirectly, by the removal of obstacles in the way of recovery; that Nature is always the efficient curative agent, and therefore that the physician is Nature's servant, not her master." We confess to a feeling of disappointment when we finished reading this book of Mr. Barrows. His preface seemed so fair and unprejudiced, that we expected to get a plain statement of the facts, particularly as he had stated that he had enjoyed exceptional facilities for study and investigation. If mental healing "is to get and retain a hold upon the popular attention," and if "the subject needs only to be presented to educated, thoughtful persons in the right way, to appeal to their intelligence and convince their reason," we fear it must be done in a much simpler, more matter-of-fact, and less metaphysical manner than has been done by the author of 'Facts and Fictions of Mental Healing.'

NOTES AND NEWS.

THE officers for the next meeting of the American Association were nominated as follows: president, J. W. Powell of Washington; vice-presidents, Ormond Stone of the University of Virginia (Mathematics and Astronomy), A. A. Michelson of Cleveland (Physics), C. E. Munroe of Newport (Chemistry), Calvin M. Woodward of St. Louis (Mechanical Science), George H. Cook of New Brunswick (Geology and Geography), C. V. Riley of Washington (Biology), C. C. Abbott of Trenton (Anthropology), C. W. Smiley of Washington (Economic Science and Statistics); permanent secretary, F. W. Putnam of Cambridge (office Salem, Mass.); general secretary, J. C. Arthur of La Fayette; secretary of the council, C. Leo Mees of Athens; secretaries of the sections, C. L. Doolittle of Bethlehem (Mathematics and Astronomy), A. L. Kimball of Baltimore (Physics), William L. Dudley of Nashville (Chemistry), Arthur Beardsley of Swarthmore (Mechanical Science), George H. Williams of Baltimore (Geology and Geography), N. L. Britton of New York (Biology), Frank Baker of Washington (Anthropology), Charles S. Hill of Washington (Economic Science and Statistics).

— The arrangements for the tenth annual meeting of the American Society of Microscopists are now definitely made. The society convenes in Pittsburgh, Penn., Aug. 30, 1887, and will probably continue its sessions four or five days. There will be a field-excursion to Chartiers, and the society will be invited to visit the extensive steel-works of Carnegie, Phipps, & Co., at Braddock. The party will go by steamer up the historic Monongahela: a field-excursion has been planned in connection with this pleasure-trip. There will be collected a temporary library of rare books and manuals. A considerable number of volumes have been promised. These will be under the constant care of a librarian.

LETTERS TO THE EDITOR.

*** The attention of scientific men is called to the advantages of the correspondence columns of SCIENCE for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.*

The editor will be glad to publish any queries consonant with the character of the journal.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

An Insect-Fight.

AN observation quoted by Professor Morse in his address before the American Association last night is so exactly confirmed by a recent observation of my own, that it seems worth while to put it on record.

While sitting in a hammock slung between two large maple-trees on the lawn, I heard a loud buzzing and fall of something behind me, and, looking around, I saw on the grass a locust (cicada) in the grasp of a large insect, evidently of the wasp family, but which I am not sufficiently well posted in entomology to name. It had brown wings, and large abdomen colored black or dark brown with white spots. The whole length of the insect was about thirty-five or forty millimetres. When first seen, the struggling locust was on its back; the wasp extended above it head to head, and industriously plying its sting between the abdominal wings of the locust. The locust quickly became quiet, and then the wasp, maintaining its former position, which it did not at any time abandon, grasped the head of the locust by the middle pair of legs, and, using the other four legs for locomotion, started to drag it through the short grass toward one of the trees. There was no hesitation or uncertainty, but the wasp started at once in a straight line for the foot of the tree. On reaching the tree, the wasp began without pause to carry its burden up the trunk, using its four legs for walking, as before, and assisting itself to sustain the weight of the locust by putting its wings in operation. In this way, with a few brief pauses as if to rest and get better hold, in one of which it hung for a moment apparently by one leg, the locust was carried up among the branches of the maple, some twenty feet or so, where it became difficult for me to follow its motions. After reaching such a height, the wasp flew off in a straight line through the branches, and went out of sight. I think it carried the locust with it, but the height was so great that I could not be positive. At any rate, the locust did not fall to the ground, although, as the

wasp's flight started from a crotch in a limb, it is possible that the locust was left in the crotch. The whole incident showed a perfect understanding, on the part of the wasp, of what he proposed to do, and the carrying-out of a preconceived plan of procedure without any stopping to think what he would do next. The only pauses were in going up the trunk of the tree.

C. G. ROCKWOOD, JR.

New York, Aug. 11.

A Good Word.

I SEE by your last issue that the Teachers' National Association indorsed the Blair bill. I am sorry to learn of this, as I think that bill is an imposition upon the intelligence of the people of this country.

In the first place, any State that cannot support schools in which to educate its children must be poor indeed; and, in the second place, any State that would accept national aid has not the spirit necessary to a sound government. We can plainly see where the most of that aid would go, and we do not feel like sending it into those States. I am aware that many will deem me unjust; but, be that as it may, I would never consent to the Blair bill, and I am sorry that my fellow-teachers ever gave their indorsement to such a bill, as by so doing it may have some weight in the future; but then teachers are only mortals, and many of them seem to have very poor judgment.

I am glad to see the position that *Science* takes in this matter, and you may rest assured that I shall be a life subscriber to that paper. I consider it the best paper published in this country for any advanced teacher or scientific man. I wish you the best of success.

JAMES LAWREY.

Fremont City, Io., Aug. 8.

The Formation and Dissipation of Sea-Water Ice.

SEA-WATER possesses several characteristics that make the operation of freezing different from that in the case of fresh water.

The density of sea-water increasing till the freezing-point is reached, it follows that its conversion into ice will take place beneath, instead of at the surface as in the case of fresh water. The freezing-point in most cases, then, should be situated near the bottom of the column of water, if not actually at it.

In equal thicknesses of fresh and sea water ice, two inches of the first will support a greater weight, without fracture, than an equal thickness of the latter; although it is quite possible, that, where greater thicknesses are concerned, the advantage may be in the opposite direction.

Sea-water ice is much less 'brittle' than that of fresh water; rising and falling under the influence of a heavy sea, and adapting itself to its undulations, in cases where fresh-water ice would be fractured: this is particularly noticeable in the earlier stages of its formation.

An inch of newly formed sea-water ice will not support a man's weight, and, in giving way beneath him, does so abruptly, without any warning preliminary fissures, leaving a cleanly cut hole of the same extent as the surface over which direct pressure was administered, and thus differs from fresh-water ice, which, on being fractured in this way, carries down a large portion of the surface beyond the area directly under pressure. We may therefore conclude that the cohesion amongst the particles in fresh-water ice is greater than in the case of sea-water, and possibly that the arrangement of the ice-crystals is different in each. Those in the case of fresh water, forming horizontally at the surface, overlap and bind each other together, whilst those from sea-water would seem to arrange themselves vertically, as a comparison of the fractures in each case will show.

The formation of a film of ice over a sheet of sea-water takes place indifferently, as to position, during calm weather; but, with a light breeze blowing, the permanent formation commences at the windward shore; narrow and rapidly lengthening 'streamers' form from the points of this shore; continuing, and growing very slowly narrower as it does so, it may reach a length of from four

hundred to five hundred yards; then parallel streamers combine, till at last the entire surface is covered. A great peculiarity of the proceeding is the extreme narrowness of these streamers in comparison to their great length, and the consequently great cohesion that is capable of overcoming the strain that must be caused by even a light wind blowing over so lengthy a surface, whilst it is rising and falling to the pronounced ripple on the water's surface.

Recently formed sea-water ice is not of uniform texture throughout its depth. A section of four inches would be represented by a thin layer of partially decomposed ice, looking very much like thoroughly saturated snow; then about two inches of 'sodden' ice, occupying a condition intermediate between that of the surface film and fully formed ice, both in consistency and appearance; and, finally, the fully formed ice, having every appearance of fresh-water ice. These differences in the several strata of the ice do not continue, once the temperature of the air becomes very much lower than that of the water's freezing-point.

When the ice is first formed in tidal waters, that portion of it which is left aground above low-water mark freezes to the bottom (the temperature of the air being supposed to be below the water's freezing-point); so that, on the water rising again, it is left there, submerged. Over this, at the surface of the water, another ice-film is formed, which, on reaching the level of the submerged ice, is frozen to and remains with it in this position. This operation is repeated, till the result is, that a perpendicular wall of ice forms, whose outer limit is the low-water mark, terminated by a horizontal surface shorewards at the limit of high-water mark. The outcome of this peculiarity is, that the shore outline in winter undergoes a complete transformation, of more or less extent in accordance with the difference existing between high and low water mark. In the case of a mud or sand bottom, the ice, though freezing to it, possesses sufficient buoyancy to raise a film of mud or sand with it each time, till it is of sufficient thickness to counteract this tendency.

The explanation of this phenomenon seems to me to be as follows: in the first place, it is essential that the temperature of the air should be below the freezing-point of the water; and, in the next place, it is evident that the temperature of the earth forming the bottom must be above the freezing-point, else ice would form there; still, it need not be much above it, as the water, being very nearly at the temperature of its freezing-point, would reduce the surface of the bottom to that point, less the increase in temperature consequent on the convection of the earth's heat to that surface. The freezing-point of sea-water being $26^{\circ}.7$, the melting-point of sea-water ice $28^{\circ}.8$ (*Science*, ix. No. 228, x. No. 332), then, if the temperature of the bottom lies between these values, we can understand, that, when the formed ice is placed in contact with it by the falling tide, the temperature of the air reduces that of the water which is running off the ice as the tide leaves it, so that it freezes and cements the ice to the bottom. To free it again requires that the temperature of either the air or the water should rise above $28^{\circ}.8$, which, with the water at $26^{\circ}.7$ and the atmosphere below this point, is not possible: therefore our ice remains fast to the bottom.

Fresh water freezing, and its ice melting, at the same temperature, it cannot possibly freeze to the bottom; for, granting that the temperature of the water may be 32° , that of the bottom must be above, both on account of the water in contact with it being at a higher temperature than this, and because, even if we assume the temperature at 32° throughout, that of the bottom must be above this, owing to convection, as before stated. Anchor-ice does form in fresh water, but not on the bottom proper, as it attaches itself to boulders or pebbles which are not themselves in perfectly continuous connection with the bottom proper, and are therefore largely surrounded by the water, and correspondingly affected by its temperature, whilst insensibly affected by convection; so that, if we can assume conditions under which the water's temperature would be below the freezing-point, we have those cases in which anchor-ice will form.

On account of the position of the freezing-point in a column of sea-water, it is possible, under certain conditions, for two films of ice to form, one below the other. This was actually observed to have taken place under the following conditions: the temperature

of the water at its surface had been 29° for some days, when a very rapid and extensive fall in the temperature of the air took place; the following morning a film of ice half an inch thick had formed beneath the surface, and had become fixed in position at the under surface of the harbor-ice, whilst another film a quarter of an inch thick had formed at the surface of the water, leaving a space between them of about four and one-half feet.

The dissipation of sea-water ice by the approach of spring takes place at first much more rapidly from the upper than the under surface, the atmosphere reaching the required temperature so much sooner than the water. No sensible effect had been produced by the water till its temperature exceeded 29° , when a loss of transparency and vertical stratification of the ice became visible as the first signs of its dissipation from beneath. In the mean time, of a total thickness of four and one-half feet, eight inches of the upper surface had been dissipated.

W. A. ASHE.

The Observatory, Quebec, July 29.

The Florida Heron.

MR. SHUFELDT'S article on the wanton destruction of our heronries I found decidedly depressing reading. As an eye-witness, he was able to give graphic pictures of both life and death. There is perhaps no bird more beautiful, and at the same time more harmless to mankind. Indeed, it is its wonderful beauty that brings its cruel death; and the lack of fear and cunning, being never engaged in mean work, makes it all too easy for the barbarous murderer to approach. The heron is unfortunate. Nature has given it what human vanity makes valuable; and as only death can bring this beauty within reach of the hard-hearted wretches, whom money will induce to do many revolting things, the poor bird must die. If this were the only instance of the kind, it would be yet more painful to our better natures, and those who are guilty of the outrage would seem to us more blameworthy. In truth, it is the trivial use to which the heron's plumes are put that makes the act of getting them so detestable. The taste which calls for them is that of creatures not yet developed to the highest form. Would a bird's feather of any kind add to Venus de Medici? Yet feathers, even those of a buzzard's tail, would adorn an Indian female. When we contemplate any young lady of our age and generation, whose head is so covered with feathers that the only part of the impression the memory retains is that of the curiously combined mass of bird-plunder, we are apt to be led to reflections which it would be cruelty to the good-intentioned girl to make known to her. If the gentle creature is really beautiful, that beauty cannot be adorned, except from within. Any attempt to add to it externally by bright-colored ribbons, flashing jewelry, or plumage, is always shocking to refined minds. If beauty is lacking, the use of accessories to make up what nature has denied is quite certain to excite contempt or compassion.

The truly hideous practice, in vogue a few years ago, of wearing the bodies of birds on the head, seems to have been too much, even for the calloused sensibilities of people of fashion. To be attacked by hungry cats, or to see the famous myth of a spring chicken on Biddy's proudly erect head, was too unpleasant. That there was any sentiment about it is not easily conceivable. The silent woods and meadows did not trouble the dissipated young female of the city. She must be in the fashion, or she must die; and, if she reasoned at all, it was to the effect that it were better that birds should die than that she should give up her slavish ghost.

The fate of the heron is plain. After the slaughter has continued until only here and there a shy one can be found, they will probably assemble in convention, and migrate, to be seen by us no more.

It would be idle to legislate, for only hunters know the way to their resorts, and the former would hardly do for constables. The very habits of a hunter would make it impossible to catch him at it; and, as he likes the sport too well, it would not be practicable to try bribery. The horrible evil will have to be put up with until fashion shall dictate something to take the place of the matchlessly beautiful plumage, or until the frightfully persecuted bird takes itself to remote regions impossible of access to man.

This topic has occupied my mind at times for many years, and I have mourned over the fate of the harmless denizens of our glades;

but I have never been able to form a plan of hinderance that did not soon prove impracticable. I have submitted with a sigh which sometimes became almost a groan. My experience will, I fear, have to be that of all who become interested in the subject. The few words which I have brought together here may be of use in checking the abominable fashion: otherwise they are useless.

L. R. PEET.

Yalaha, Fla., Aug. 11.

Answers.

12. MOSQUITOES.—In *Science* for Aug. 5, 'T. J. H.' queries concerning the re-appearance of mosquitoes on Staten Island seven days after a storm. Though I have made some notes in reference to *Culex* from time to time, this fact has never been observed. Storms are always disastrous to insect-life, and will kill or blow away moths and butterflies, as well as mosquitoes; but that these latter insects should re-appear in numbers seven days after a storm, will depend entirely upon whether the majority of the pupæ have reached maturity or not at that time. Mosquitoes are present in numbers all summer on the salt meadows, — indeed, I have scooped with my two hands together hundreds of their larvæ from the little pools, — but it is only at intervals of about a month that they swarm on the upland. During the latter week in May or first week in June, and the first days of July and August, I have noted swarms of mosquitoes in past years. The worst visitation of all is likely to be the July one, or at least it has been generally so. On low ground and near the meadows I have seen horses in July dressed in garments made for the occasion, and others decked with a profusion of wild indigo, that shook violently as they trotted along. The older residents remember well the mosquito visitation of July 3, 1862, when the vegetables were left unpicked in the garden for a week, and people wore mosquito-net over their hats.

WM. T. DAVIS.

Tompkinsville, Staten Island, Aug. 9.

13. ELECTRICITY AND THE EARTH.—In your issue of Aug. 5, Mr. M. A. Veeder points out some passages in Deschanel's text-book of physics, which he takes to imply that moist air is a good conductor of electricity, and that the earth is a reservoir of electricity; and then he asks, "Has Deschanel been superseded?" I do not happen to have the book referred to at hand, but it does not matter. It is true enough that one may complete an electric circuit through the earth, or through any part of it, when there is proper conducting-material at the wire terminals, not otherwise. The earth, in such case, acts solely like a return wire to complete the electric circuit, and its sole function is conductivity between points that differ in electric potential. As most of the earth's surface is made of conducting-materials, one may make connections for conduction almost anywhere, and it is a great convenience to be able to do so; but it does not follow that the earth stores up any electricity at all, so that it might be called a 'reservoir.' Electricity is but a transient phenomenon, and, when it does work in no other way, is changed at once into heat, in the earth as well as anywhere else. It is therefore improper and misleading to speak of the earth as a reservoir of electricity. As to the effect of a damp atmosphere upon electrical machines, it is well enough known that if means be provided for preventing the deposition of moisture upon the surface of such machines, by heating or otherwise, the machines may be kept electrified for an indefinite time. The electricity generated creeps over the damp surfaces of wood or wax or varnish to the earth, not through the air, whether moist or not. If moist air were a good conductor of electricity, or if it were one of the best conductors, as was stated by Mr. Garriott, it is highly probable that telegraph companies would have found it out long ago, and have had to insulate the wire from the air, instead of which they find it only necessary to insulate from the posts upon which the wires are hung. There is nothing new or strange about these things, except it be, that, having been patent to all for so long a time, they should be unknown to any who are pretentious enough to criticise the labors of those who work according to knowledge, and at the same time evolve out of their consciousness a theory unsupported by a single experiment, and directly contradicted by all we do know.

A. E. DOLBEAR.

New York, Aug. 12.